***Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ TP: \_\_\_\_***

CW#56H: Composite Functions

Honors Geometry

|  |  |
| --- | --- |
| **CRS** | **Geometry Content/FUN601 - Ev**aluate composite functions at integer values. |
| **Objective** | * 10.1 - Evaluate composite functions at integer values * 10.2 - Write an expression for the composite of two simple functions. |

**Teacher Notes**

*What does it mean when we write f(x), g(a), h(t), etc? – It means when the function (f, g, h, etc.) is evaluated at (x, a, t, etc.) it behaves like this:  or however.*

***Composition of functions:*** *Process through which an entire function is substituted into another function.*

*Two types of composition* ***notation****: 1) f(g(x)) and 2) (f g)(x). Read: f of g of* ***or ” f after g of x”***

***Example 1:*** *Let f(x) = 2x -7 and g(x) =. What is the value of f(g(2))? 🡨Want to start from the inner most (), Recall PEMDAS.*

***Step 2:*** *Substitute the value from step 1 (the inside function) into the “outside” function.*

***Step 1:*** *Substitute the value into the “inside” function.*

Take the function ***g*** and evaluate it at **2.** How does it behave?

**8**

f(x) = 2x -7

g(x) =

**= 9**

**=**

*f(g(2)) =* ***9*** *.*

**2**

*Now we are left with f(8)*

|  |  |
| --- | --- |
| Now find g(f(2)).  Did you get the same answer? | What does that tell you about the order in which you evaluate the functions? |
| **Example 2:**   1. Let f(x) = 3x+ 5 and g(x) = x- 7, find (g f)(4).   **Example 3: Let** f(x) = and g(x) = x +2, Find (f g). b) Find (g f)(x)    c) Find f(f(x))  \*Note when a value is not given for the composition, it is implied to evaluate it at its given value; x, t, a etc. | 1. Find (f g)(4). 2. Find f(g(2)) | |

***CLASSROOM COPY - DO NOT WRITE ON!!!***

1. **H(4.5)**
2. **(H r)(2.8)**
3. **r(r(3.0))**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| *t* | 2.0 | 2.2 | 2.4 | 2.6 | 2.8 | 3.0 |
| *r(t)* | 1.2 | 1.5 | 3.0 | 2.8 | 2.5 | 2.0 |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| *t* | 2.0 | 2.5 | 3.0 | 3.5 | 4.0 | 4.5 |
| *H(t)* | 2.8 | 2.6 | 2.5 | 2.0 | 1.0 | 2.2 |

**Example 4:**

CW#56H: Composite Functions

Honors Geometry

|  |  |
| --- | --- |
| **CRS** | **Geometry Content/FUN601 - Ev**aluate composite functions at integer values. |
| **Objective** | * 10.1 - Evaluate composite functions at integer values * 10.2 - Write an expression for the composite of two simple functions. |

|  |  |  |
| --- | --- | --- |
| **Practice!** | | |
| 1) Let f(x) = 5x + 2 and g(x) = x - 2.  a) Find f(g(-4)).  b) Find g(f(-4). | 2) Let p(x) =  and r(x) = x + 4.  a) Find (pr)(2).  b) Find (rp)(2). | |
| 3) Let w(x) = . Find w(w(-2)). | 4) Let j(x) = and k(x) = -0.5x.  a) What is j(k(6))?  b) What is (kj)(6). | |
| 5) Let p(x) = . Find p(p(-6)). | 6) Let q(x) = . Find q(q(-2)). | |
| 7) Let f(x) = 3x- 2 and g(x) = .  a) Find f(g(25)).  b) Find g(g(1296)) | 8) Let w(x) =  and r(x) = .  a) Find (wr)(9)  b) Find (rr)(256). | |
| 9) Let f(x) = 6x + 3, g(x) = , and h(x) = -7x  Find h(f(g(3))). | 10) Let f(x) = 2x- 2, g(x) = , and h(x) = 2x  Find g(h(f(7))). | |
| 11) Create your own composition of functions:  a) f(x) = \_\_\_\_\_\_  b) g(x) = \_\_\_\_\_\_  c) Find \_\_\_\_\_\_\_  *Have your neighbor solve.* | 12) Create your own composition of functions:  a) f(x) = \_\_\_\_\_\_  b) g(x) = \_\_\_\_\_\_  c) Find \_\_\_\_\_\_\_  *Have your neighbor solve.* | |
| 13 a) Compute **f(g(x))** if g(x) = 2x + 1 and  f(x) = x- 3.  b. Compute **g(f(x))** if g(x) = -2x + 1 and f(x) = -x - 3.  c. Compute **f(f(x))** if g(x) = 8x2 and f(x) = 0.5x - 2. | 14 a) If g(x) = 3x + 2 and f(x) = x2 + 3, compute **(g f)(x)**.  b. If g(x) = and f(x) = x2 + 3, compute **g f(x)**.  c. Compute **g g(x)** if g(x) = 2x + 1 and f(x) = 1x- 3. | |
| 15) Compute a(b(x)) if a(x) = 2x -1 and b(x) = 3x + 3. | | 16) Compute b(a(x)) if a(x) = 2x -1 and b(x) = 3x + 3. |
| 17) Compute a(b(x)) if a(x) =  and b(x) = 2x - 8.  *SIMPLIFY AT THE END!* | | 18) Compute b(b(x)) if a(x) = 2x -1 and b(x) = 8x - . |
| 19) Compute a(b(-2)) if a(x) = -5x3 and b(x) =. | | 20) Compute b(a(-2)) if a(x) = 2x -1 and b(x) = 3x + 3. |
| 21) Let g(x) =  and j(x) = x + 2.  a. Find g j(x).  b. Find j g(x). | | 22) Let f(x) =  and j(x) = 2x + 2.  a. Find f j(x).  b. Find j f(x). |
| |  |  |  | | --- | --- | --- | | x | f(x) | g(x) | | -1 | -2 | 2 | | 0 | 1 | -3 | | 1 | 3 | -2 | | 2 | -3 | 1 |   23)  **a.** Find (g f)(0).  **b.** Find (f g)(-1).  **c.** Find g(g(2)). | | 24) Let f(x) =  and g(x) = x - 3.  a. Find g f(x).  b. Find f g(x). |
| **CHALLENGE PROBLEMS & ACT Style** | | |
| 25)     1. 27 2. 30 3. 58 4. 72 | | 26) If f(x) = 2x² + x and g(x) = f(f(x)), what is the value of g(1)?   1. 3 2. 18 3. 21 4. 39 |
| **Yay! More Brain Teasers**  **“Through great struggle comes great reward!”** | | |
| Connect the nine dots using 4 straight lines and without lifting the pencil. | | You have six eggs in a basket. How do you distribute them so that one egg remains in the basket?  http://2.bp.blogspot.com/-qY9r5kizcK0/T3pV_vw-9jI/AAAAAAAAF98/0yl9S9DW8fI/s1600/basket.jpg |